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(54) DEFENSE OF INFECTION AND SHEET FOR DEFENDING INFECTION

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(57)Abstract:

PROBLEM TO BE SOLVED: To defend a dermatosis, with which elderly people and AIDS patients are liable to be affected, caused by a pathogenic organism such as Sarcoptes Scabies, by using a sheet comprising an inclusion compound obtained by including cyclodextrin in a volatile organic antimicrobial agent and an amorphous calcium phosphate.

SOLUTION: A sheet comprising an inclusion compound obtained by including cyclodextrin in a volatile organic antimicrobial agent such as isothiocyanate and/or an oil extracted from white-cedar and an amorphous calcium phosphate is laid under bedding or used as a sheet or a cover for bedding and the antimicrobial agent is vaporized by water evaporated from a human to defend infection with Candida albicans, Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, etc.

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[Claim(s)]

[Claim 1] The phylaxis approach which uses the sheet containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate.

[Claim 2] The phylaxis approach according to claim 1 characterized by volatilizing said organic system antimicrobial agent with the moisture which covers the bottom of bedding with said sheet, or uses it as the sheet for bedding, or covering, and evaporates from people.

[Claim 3] The phylaxis approach according to claim 1 that the organic system antimicrobial agent which has volatility is characterized by being isothiocyanate and/or Khiva extracted oil.

[Claim 4] Candida albicans, Escherichia coli, Staphylococcus aureus and Psedomonas aeruginosa, Cytrobacter freundii and Proteus mirabilis, Klebsiella pneumomiae and Serratia marcescens, Salmonella enteritidis and Vibrio cholerae Or Vibrio parahaemolyticus claim 1 characterized by defending the infection to at least one sort thru/or 3 -- either -- the phylaxis approach of a publication.

[Claim 5] The sheet for phylaxis containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate.

[Claim 6] The sheet for phylaxis which is a sheet which mixes and comes to process into thermoplastics the clathrate compound particle and amorphous calcium phosphate particle which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and is characterized by the mean particle diameter of this clathrate compound particle and the mean particle diameter of an amorphous calcium phosphate particle being larger than the average thickness of this thermoplastics sheet.

[Claim 7] The sheet for phylaxis which is a sheet which mixes and comes to process into thermoplastics the antibacterial particle containing the clathrate compound and amorphous calcium phosphate which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and is characterized by the mean particle diameter of this antibacterial particle being larger than the average thickness of this thermoplastics sheet.

[Claim 8] The sheet for phylaxis with which the paint film containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate is characterized by coming to be prepared on the whole surface or some of one [at least] thermoplastics sheet of a field.

[Claim 9] There is no claim 6 characterized by preparing two or more slitting or holes in said sheet for phylaxis, and it is the sheet for phylaxis of a publication 8 either.

[Claim 10] The sheet for phylaxis characterized by coming to prepare the paint film containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate on the whole surface or some of one [at least] sheet of a field which has permeability.

[Claim 11] The sheet for phylaxis according to claim 10 characterized by being the sheet with which the sheet which has permeability comes to carry out the laminating of two or more sorts by consisting of one sort of paper, a nonwoven fabric, or textile fabrics.

[Claim 12] It is the sheet for phylaxis which the clathrate compound particle and amorphous calcium phosphate particle which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin are grasped between the sheet base materials of two sheets, and is characterized by at least one side of this sheet base material being a sheet base material which has permeability.

[Claim 13] It is the sheet for phylaxis which the antibacterial particle containing the clathrate compound and amorphous calcium phosphate which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin is grasped between the sheet base materials of two sheets, and is characterized by at least one side of this sheet base material being a sheet base material which has permeability.

[Claim 14] There is no claim 5 characterized by the organic system antimicrobial agents which have volatility being isothiocyanate and/or Khiva extracted oil, and it is the sheet for phylaxis of a publication 13 either.

[Claim 15] Candida albicans, Escherichia coli, Staphylococcus aureus and Psedomonas aeruginosa, Cytrobacter freundii, Proteus mirabilis, Klebsiella pneumomiae and Serratia marcescens, Salmonella enteritidis and Vibrio cholerae Or Vibrio parahaemolyticus claim 5 characterized by defending the infection to at least one sort thru/or 14 -- either -- sheet for phylaxis of a publication.

[Detailed Description of the Invention]

[0001]

[The technical field to which this invention belongs] This invention relates to the approach of defending that pathogen living things, such as a pathogenic bacterium in the internal environment of the bedding used in a hospital, an old-man facility, etc., a pathogenic fungus, and a pathogen mite, are infected with a patient, and the sheet for phylaxis which can be used for it.

[0002]

[Description of the Prior Art] By the advance of the iatrotechnique in recent years, people's life is prolonged and it is going to greet the aging society. Moreover, the number of bedridden old men in an old-man facility etc. is huge, and is in the inclination which will increase further from now on.

[0003] In such a bedridden old-man facility, the hospital infection by pathogen living things, such as a pathogenic bacterium, a pathogenic fungus, and a pathogen mite, poses an important problem. Since it is dry, especially the old skin tends to cause various problems. Although disinfectants, such as a cream with which the antibiotic and the antigen truth agent went into a patient's skin, or strong stimulative croton oil, are

conventionally applied to these infection patients, even if it once recovers, reinfection is carried out in many cases, and their brains are racked for the repulsing method. Moreover, since these drugs are applied to the direct skin, they have also produced problems, such as allergy to it.

[0004] the skin disease of the above [the patient who is in the immunological deficient state of an acquired immunode-ficiency syndrome patient, a transplant patient, a leukemia patient, an innate immunity insufficiency patient, etc. even if it is not elderly people] -- generating -- easy -- various antimicrobial in using large sum sterile room in a conventional method -- taking orally -- or it passes, preventive administration is carried out in vein, and these health care costs have become a vast quantity of frames.

[0005] On the other hand, although the antibacterial material of a food grade is known, since classes completely differ with the disease germ which poses a problem by the infection to the bacillus and those who pose a problem with food, it is not necessarily clear whether the antibacterial material of a food grade is applicable to the phylaxis as it is. For example, as an antibacterial object of food, although there are Aspergillus niger, Fsarium, Geotrichum candidum, Alternaria, etc., these true fungi are hardly seen on clinical (Manual of clinical microbiology, -5th ed., :editor in chief, AlbertBalows, American Society for Microbiology, P7-8).

[0006]

[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering cheaply the method of removing safely and effectively for antimicrobial taking orally or the smell which is easy to generate in a sickbed etc., while defending infection safely, without passing, carrying out preventive administration in vein, or applying a disinfectant and antimicrobial to the skin, and the sheet for phylaxis which can be used for it.

[0007]

[Means for Solving the Problem] An example is taken by the above-mentioned technical problem. Wholeheartedly as a result of research this invention person etc. The sheet containing the clathrate compound which carried out inclusion of the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility as antimicrobial to the cyclodextrin especially isothiocyanate, and/or the Khiva extracted oil is used. By making a sickbed full of the above-mentioned antimicrobial agent, it found out that infection of pathogen living things, such as a yeast infection bacillus, Candida albicans by which being infected with the body especially is known, and Sacoptes scabiei infected with the body, etc. could be defended effectively. Moreover, a header and this invention were completed for the ability of the smell which

is easy to generate in the sickbed of the elderly people who became especially bedridden to be deodorized effectively by including amorphous calcium phosphate in a sheet with the above-mentioned clathrate compound.

[0008] That is, this invention is the phylaxis approach which uses the sheet containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate. Moreover, this invention is the phylaxis approach characterized by volatilizing said organic system antimicrobial agent with the moisture which covers the bottom of bedding with said sheet, or uses it as the sheet for bedding, or covering, and evaporates from people.

[0009] Furthermore, this invention is a sheet for phylaxis containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate. Furthermore, this invention is a sheet which mixes and comes to process into thermoplastics the clathrate compound particle and amorphous calcium phosphate particle which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and is a sheet for phylaxis characterized by the mean particle diameter of this clathrate compound particle and the mean particle diameter of an amorphous calcium phosphate particle being larger than the average thickness of this thermoplastics sheet.

[0010] Furthermore, this invention is a sheet which mixes and comes to process into thermoplastics the antibacterial particle containing the clathrate compound and amorphous calcium phosphate which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and is a sheet for phylaxis characterized by the mean particle diameter of this antibacterial particle being larger than the average thickness of this thermoplastics sheet.

[0011] Furthermore, this invention is a sheet for phylaxis with which the paint film containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate is characterized by coming to be prepared on the whole surface or some of one [at least] thermoplastics sheet of a field.

[0012] Furthermore, this invention is a sheet for phylaxis characterized by coming to prepare the paint film containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin, and amorphous calcium phosphate on the whole surface or some of one [at least] sheet of a field which has permeability.

[0013] Furthermore, it is the sheet for phylaxis with which the clathrate compound particle and amorphous calcium phosphate particle which carried out inclusion of the organic system antimicrobial agent with which this invention has volatility to the cyclodextrin are grasped between the sheet base materials of two sheets, and at least one side of this sheet base material is characterized by being the sheet base material which has permeability.

[0014] Furthermore, it is the sheet for phylaxis with which the antibacterial particle to which this invention contains the clathrate compound and amorphous calcium phosphate which carried out inclusion of the organic system antimicrobial agent which has volatility to the cyclodextrin is grasped between the sheet base materials of two sheets, and at least one side of this sheet base material is characterized by being the sheet base material which has permeability.

[0015]

[Embodiment of the Invention] Although the compound which has volatility under ordinary temperature and has sterilization and bacteriostatic action as an organic system antimicrobial agent in this invention to pathogen living things, such as a pathogenic bacterium infected to people, a pathogenic fungus, and a pathogen mite, can be used, a point to the isothiocyanate (general formula: R-N=C=S) and Khiva extracted oil of antibacterial effectiveness are especially desirable also in them.

[0016] As isothiocyanate, allyl isothiocyanate (chemical formula: CH2=CHCH2NCS), isothiocyanic acid isoamyl, isothiocyanic acid isobutyl, isothiocyanic acid isopropyl, isothiocyanic acid ethyl, isothiocyanic acid nitrophenyl, phenyl isothiocyanate, isothiocyanic acid butyl, isothiocyanic acid propyl, isothiocyanic acid benzyl, methyl isothiocyanate, etc. can use it suitably. Moreover, what is generally marketed can be used as Khiva extracted oil.

[0017] In addition, in this invention, hinokitiol and terpenes are unsuitable as an organic system antimicrobial agent. Even if it uses these matter, the infection to the man of a pathogen living thing cannot be defended.

[0018] What is necessary is to dissolve in the alcohol which mixes with this organic system antimicrobial agent with water at freedom that what is necessary is just to carry out with a conventional method, and just to carry out spray drying of it to the slurry which added the cyclodextrin using a spray dryer etc., after the inclusion to the cyclodextrin of the above-mentioned organic system antimicrobial agent carries out mixed churning. As for mixing with an organic system antimicrobial agent and the above-mentioned cyclodextrin addition slurry, it is desirable to carry out by carrying out convection-current churning using a homomixer under a room temperature. In addition,

cyclodextrins may be any of alpha mold, beta mold, and gamma mold, and may mix those two or more sorts.

[0019] Thus, especially for a limit, the mean particle diameter of the clathrate compound particle obtained is 5-200, although there is nothing. It is desirable that it is mum grade. moreover, the case where process what mixed this clathrate compound particle to thermoplastics, and it considers as a sheet so that it may mention later -- the mean particle diameter of a clathrate compound particle -- the average thickness halfbeak of a sheet -- the case where it is such a sheet for phylaxis since an organic system antibacterial component can be effectively vaporized by enlarging -- the mean particle diameter of a clathrate compound particle -- 10-200 Considering as mum grade is desirable.

[0020] The amorphous calcium phosphate (it may abbreviate to ACP below Amorphous Calcium Phosphate :) particle used by this invention can corn and manufacture the slurry containing ACP. After adding preferably the dispersant which is a water soluble polymer, for example, thoria krill acid ammonium salt, 0.1 to 3% of the weight 0.1 to 10% of the weight to the calcium-hydroxide suspension under churning and obtaining a mixed solution to it, such a slurry trickles a phosphoric-acid water solution into this mixed solution under churning, and is obtained by adjusting pH 11-5. Moreover, addition of a dispersant may be performed after a phosphoric-acid water solution is dropped. It is desirable to use the approach of carrying out spray drying using a spray dryer etc. for a granulation, and it can obtain ACP of the shape of a particle of arbitration.

[0021] Thus, the diffraction pattern according [the matter obtained] to a powder X-ray-analysis method shows that it is calcium phosphate, and it is checked that the pattern is broadcloth, and it is ACP (formula: calcium3(PO4) 2andnH2O) since it differs from the diffraction pattern of hydroxyapatite or tricalcium phosphate. This ACP particle is the matter [activity / in static electricity / from water of crystallization being included], and can adsorb offensive odors of the living body origin, such as hircismus leading to [stinking] a thing, ****, a hair smell, and a physiology smell. Especially for a limit, the mean particle diameter of an ACP particle is 5-200, although there is nothing. It is desirable that it is mum grade. Moreover, as for an ACP particle, it is desirable that it is porosity, and especially its specific surface area is [the thing more than 10m2/g] desirable.

[0022] The clathrate compound particle and ACP particle in this invention may be used as an antibacterial particle containing a clathrate compound and ACP, although it may mix suitably and you may use, after manufacturing in the shape of a particle separately

respectively as mentioned above. An antibacterial particle can be manufactured by corning, after adding gradually the organic system antimicrobial agent which mixes a cyclodextrin to the above-mentioned ACP slurry, and has volatility in the obtained mixed slurry and carrying out inclusion of this organic system antimicrobial agent to a cyclodextrin. Although a spray drying method, a freeze drying method, etc. can be used for a granulation, it is desirable to use especially a spray drying method.

[0023] It is 5-200 like [an antibacterial particle] an ACP particle. What has the mean particle diameter about mum is desirable. Moreover, a porous thing is desirable and the thing more than 10m2/g has especially a desirable specific surface area. As for the rate of an use rate of a clathrate compound particle and an ACP particle, it is desirable that it is 99:1-1:99 in a weight ratio. The same is said of the content ratio of a clathrate compound and ACP in an antibacterial particle.

[0024] The sheet containing the clathrate compound which carried out inclusion of the organic system antimicrobial agent which has the volatility explained above to the cyclodextrin, and amorphous calcium phosphate can be used as a sheet for phylaxis. Although the sheet for phylaxis may be what kind of mode as long as it can demonstrate the effectiveness, to the 1st, it can mix a clathrate compound particle particle and an ACP particle, or an antibacterial particle to thermoplastics, and can illustrate the thing which comes to process it in the shape of a sheet. Thus, what is necessary is just to use extrusion processes, such as blow molding generally used, an inflation, and a T-die method, etc., in order to process it in the shape of a sheet.

[0025] While volatilizing an organic system antibacterial component efficiently from a clathrate compound particle or an antibacterial particle, in order to deodorize effectively by ACP, as shown in drawing 1 , it is desirable to make it the mean particle diameter of each kind of particle (a clathrate compound particle, an ACP particle, antibacterial particle) 1 become larger than the average thickness of a sheet 2. With such a sheet for phylaxis, since it is held in the condition of having exposed from the front face of a resin sheet, with the moisture which evaporates from people, even if each particles of most are organic little system antimicrobial agents, it is possible to make it volatilize efficiently, an organic system antimicrobial agent can be made effectively filled with it in a sickbed to the concentration by which the antibacterial effectiveness is demonstrated, and it can adsorb a smell effectively further.

[0026] Such a sheet for phylaxis can be manufactured by extending it by the proper approach, after carrying out extrusion molding of the resin which kneaded the clathrate compound particle and the ACP particle, or the antibacterial particle from the slit which once has a larger gap than the mean particle diameter of each particle. As for the amount

of mixing to the resin of a clathrate compound particle, it is desirable that it is 0.1 - 60 % of the weight, and it is especially desirable that it is 0.1 - 30 % of the weight. If it is in such range, it is stabilized and can demonstrate antibacterial. Moreover, as for the amount of mixing to the resin of an ACP particle, it is desirable that it is 0.1 - 60 % of the weight, and it is especially desirable that it is 0.1 - 30 % of the weight. If it is in such range, it is stabilized and the deodorization effectiveness can be demonstrated. When using an antibacterial particle, as for the amount of mixing to the resin of an antibacterial particle, it is desirable that it is 0.1 - 60 % of the weight, and it is especially desirable that it is 0.1 - 30 % of the weight.

[0027] Especially as thermoplastics, although not limited, polyolefine system resin (for example, polyethylene system resin, a polypropylene regin), styrene resin, EVA (ethylene-vinylacetate copolymer) resin, vinyl chloride resin, polyamide resin (for example, aliphatic series polyamide), polyester resin (for example, aliphatic series polyester), polyester amide, etc. are desirable, for example. It is desirable to use the polyolefine system resin to which a clathrate compound particle and an ACP particle, or an antibacterial particle is especially made as for kneading processing at comparatively low temperature like this mode in the sheet for phylaxis which is mixed to thermoplastics and obtained, EVA resin, vinyl chloride resin, etc.

[0028] What prepared the paint film containing the above-mentioned clathrate compound and ACP in the thermoplastics sheet as the 2nd mode of the sheet for phylaxis of this invention can be illustrated. A paint film may be prepared in which field of a thermoplastics sheet, and may be prepared in both sides. Moreover, you may prepare in the whole surface and may prepare partially. The example which formed the paint film 10 in one field of a sheet 2 at drawing 2 is shown.

[0029] Such a paint film can make organic solvents, such as toluene which added the stabilizer, the dispersant, etc. suitably, able to distribute the above-mentioned clathrate compound particle and an ACP particle, or an antibacterial particle, and can be formed by applying this dispersant by the general approaches, such as a roll coater and spray spraying. Moreover, printing means, such as gravure, offset printing, and the silk screen, can also be used as the other methods of application. Such a printing means can be especially used suitably, in case it applies to a thermoplastics sheet partially. a paint film -- the content of a clathrate compound particle -- 1-20g/m2 -- especially -- the content of 1 - 10 g/m2 and an ACP particle -- 0.1 - 19.9 g/m2 -- especially, it is desirable 0.1 - 19.9 g/m2 and that the content of 0.1 - 10 g/m2 or an antibacterial particle prepares so that it may become especially 0.1 - 10 g/m2, and it will be stabilized if it is in this range, and antibacterial and the deodorization effectiveness can be demonstrated.

[0030] With the sheet for phylaxis by this mode, since each particle is held on the surface of a sheet, with the moisture which evaporates from people, even if it is an organic little system antimicrobial agent, it is possible to make it volatilize efficiently, it can be made easily full of an organic system antimicrobial agent in a sickbed to the concentration by which the antibacterial effectiveness is demonstrated, and a smell can be adsorbed further effectively.

[0031] If two or more slitting and holes are prepared in such a sheet for phylaxis, permeability is improvable at the summer which is easy to get especially sweat. An example of the sheet for phylaxis which formed two or more slitting 20 in drawing 3 is shown.

[0032] What prepared the paint film containing the above-mentioned clathrate compound and ACP in the sheet which has permeability as the 3rd mode of the sheet for phylaxis of this invention can be illustrated. Also in this mode, a paint film may be prepared in which field of a permeability sheet, and may be prepared in both sides. Moreover, you may prepare in the whole surface and may prepare partially. The example which formed the paint film 10 in one field of permeability sheet 2' at drawing 4 is shown.

[0033] As a sheet which has permeability, nonwoven fabrics, such as papers, such as Japanese paper and WATTINGU paper, and a synthetic fiber, a cellulosic fiber, or the textile fabrics which consists of fiber material is mentioned. They may consist of one layer and may carry out the laminating of two or more sorts in consideration of reinforcement etc. Formation of the paint film to this permeability sheet can be performed by the approach explained in the 2nd mode, and the same approach. a paint film -- the content of a clathrate compound particle -- 1-20g/m2 -- especially -- the content of 1 - 10 g/m2 and an ACP particle -- 0.1 - 19.9 g/m2 -- especially, it is desirable 0.1 - 19.9 g/m2 and that the content of 0.1 - 10 g/m2 or an antibacterial particle prepares so that it may become especially 0.1 - 10 g/m2, and it will be stabilized if it is in this range, and antibacterial and the deodorization effectiveness can be demonstrated.

[0034] Since it excels in permeability, the sheet for phylaxis by this mode, especially the sheet for phylaxis which prepared the paint film containing each particle partially can be used as the sheet for a bed and bedding, and a pillow case as it is. With this sheet for phylaxis, in order that a paint film may work as a glue line, each particle does not drop out easily. According to such a sheet for phylaxis, with the moisture which evaporates from people, even if it is an organic little system antimicrobial agent, it is possible to make it volatilize efficiently, an organic system antimicrobial agent can be made easily full in a sickbed to the concentration by which the antibacterial effectiveness is

demonstrated, and a smell can be adsorbed further effectively.

[0035] As the 4th mode of the sheet for phylaxis of this invention, the thing which comes to grasp the above-mentioned clathrate compound particle and an ACP particle, or an antibacterial particle between the sheet base materials of two sheets can be illustrated. At least one side of this sheet base material needs to be what has permeability. As a sheet base material which has permeability, the same paper as the above, a nonwoven fabric, textile fabrics, etc. can be used. The sheet base material of another side may be the same permeability sheet, and may be the thermoplastics sheet which was mentioned above.

[0036] As for grasping of a clathrate compound particle, it is desirable 1 - 20 g/m2 and that the amount of a clathrate compound particle carries out so that it may become especially 1 - 10 g/m2, and if it is in this range, it will be stabilized, and it can demonstrate antibacterial. Moreover, as for grasping of an ACP particle, it is desirable 0.1 - 19.9 g/m2 and that the amount of an ACP particle carries out so that it may become especially 0.1 - 10 g/m2, and if it is in this range, it will be stabilized, and it can demonstrate the deodorization effectiveness. When using an antibacterial particle, it is desirable 0.1 - 19.9 g/m2 and that the amount of an antibacterial particle grasps so that it may become especially 0.1 - 10 g/m2.

[0037] in order to grasp each particle, a particle may be pasted up on one side of one sheet on the whole or partially, the laminating of the sheet of another side may be carried out to the adhesion side by or un-pasting up pasting up, a particle may be sprinkled on the whole or partially on one side of one sheet, the laminating of the sheet of another side may be carried out to the diffusional aspect, and the allocated type of the sheet base material of two sheets may be carried out to attachment, i.e., saccate. A former example is shown in drawing 5 and a latter example is shown in drawing 6 .

[0038] However, when the whole sheet is used as one bag like the latter, there is a possibility that each particle may move and incline. Then, deviation can be prevented, if an allocated type is carried out so that the sheet base material of two sheets may form many bag parts 21 as shown in drawing 7 . Thus, especially, even if the sheet for phylaxis which carried out the allocated type so that many bag parts might be formed is the little amount of organic system antimicrobial agents, with the moisture which evaporates from people, it can volatilize this organic system antimicrobial agent efficiently, and an organic system antimicrobial agent can be made effectively full of it in a sickbed to the concentration by which the antibacterial effectiveness is demonstrated, and it can adsorb a smell effectively further.

[0039] The sheet for phylaxis of this invention may be the sheet which fiber is made to

contain the above-mentioned clathrate compound particle and an ACP particle, or an antibacterial particle, and comes to weave the fiber, for example, or a sheet which it comes to knit, without being limited to what was illustrated above. Moreover, it is good also as a nonwoven fabric using the fiber. The sheet for phylaxis of this invention can also be covered with and used for the bottom of bedding, and can also be used as the sheet for bedding, or covering. Moreover, this sheet for phylaxis can be carried out decision and sewing, and it can also be used as a pajamas.

[0040] As a pathogenic bacterium which can prevent the infection to people with the sheet for phylaxis of this invention For example, Escherichia coli and Staphylococcus aureus, Psedomonas aeruginosa, Cytrobacter freundii, Proteus mirabilis, Klebsiella pneumomiae, Serratia marcescens, Salmonella enteritidis, Vibrio cholerae and Vibrioparahaemolyticus It is mentioned. etc. -- as a pathogenic fungus Candida albicans etc. mentions -- having -- as a pathogen mite -- the Hizen ticks and NOSHIMEMADA lame -- the larva of a clothes moth, YAKEHYOUDANI, etc. are mentioned.

[0041] Moreover, according to the sheet for phylaxis of this invention, a bedsore can also be prevented. According to the phylaxis approach of this invention using the above sheets, there is not taking orally or a fear of passing, not carrying out preventive administration in vein, or applying neither a disinfectant nor antimicrobial to the skin, and causing allergy about antimicrobial, either.

[0042]

[Example] Hereafter, although an example and the example of a trial explain this invention to a detail further, the range of this invention is not limited to these examples and the example of a trial.

[0043] [Example 1] The amorphous calcium phosphate particle was made like next, and was manufactured. In addition, this production process is typically shown in drawing 8 . The heat air which 9 is an air filter, and 10' is an electric heater, and was warmed by electric heater 10' through the air filter 9 in drawing 8 is the slurries 3a and 3b which enter in a spray dryer 5 from the heat gas chamber 11, and are sprayed by the atomizer 6 of a spray dryer 5. It flows out of a discharge hole 12 towards a cyclone 8, carrying out desiccation granulation.

[0044] The phosphoric-acid water solution which trickled the phosphoric-acid water solution diluted with water 2 to 4 times to the calcium-hydroxide suspension under churning, and adjusted pH to the 11 neighborhoods, then was diluted with water 5 to 8 times to the above-mentioned suspension was dropped, pH was adjusted to 10-9, and the ACP particle was generated. Furthermore, it is the thoria krill acid ammonium salt which is a weak alkaline water soluble polymer as a dispersant to an ACP particle 0.5

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By adding so that it may become weight %, it is particle size 0.1 [about]. The slurry which is stabilized and contains the ACP particle below mum was obtained.

[0045] It diluted with ion exchange water and obtained ACP slurry 3a was supplied to the spray dryer (Okawara chemically-modified machine company make L-8) 5 by the amount of supply 1 - 3 kg/h with the metering pump 4 so that the concentration of ACP might become 20 % of the weight about this slurry. It is 10000 - 40000 rpm about the atomizer 6 of a spray dryer 5. While setting up, ACP particle 1a whose mean particle diameter is about 25 micrometers was obtained by adjusting outlet temperature [in / for the inlet temperature of the heat gas chamber 11 / 150 - 300 ** and an exhaust port] to 60 - 100 **.

[0046] On the other hand, the clathrate compound which carried out inclusion of the allyl isothiocyanate to the cyclodextrin was manufactured as follows. In addition, the production process of a clathrate compound particle is also typically shown in drawing 8 .

[0047] It is 24000 rpm by the homomixer about water 200 g. 100 g addition of beta-cyclodextrin was done carrying out convection-current churning, 10g of allyl isothiocyanates was added after that, and churning was performed for 1 hour. Slurry 3b obtained here was supplied to the spray dryer (Okawara chemically-modified machine company make L-8) 5 by the amount of supply 1 - 3 kg/h with the metering pump 4. It is 10000 - 30000 rpm about the atomizer 6 of a spray dryer 5. While setting up, clathrate compound particle (clathrate compound particle A) 1b which carried out inclusion of the allyl isothiocyanate to the cyclodextrin was obtained by adjusting outlet temperature [in / for the inlet temperature of the heat gas chamber 11 / 150 - 200 ** and an exhaust port] to 60-100 degrees C. The mean particle diameter of this clathrate compound particle A was about 25 micrometers.

[0048] The above-mentioned ACP particle and the clathrate compound particle A were enough mixed by the Omni mixer (made in Chiyoda Research Institute) by the weight ratio of 1:9 (an ACP particle / clathrate compound particle). After mixing the obtained mixture A4 weight section and the low-density-polyethylene 96 weight section, using the extruder, extrusion was carried out and kneading and the sheet whose average thickness is about 30 micrometers were manufactured. This sheet was extended so that average thickness might be set to about 20 micrometers, and it was used as the sheet A for phylaxis. The sheet A for phylaxis has structure as shown in drawing 1 .

[0049] [Example 2] The antibacterial particle was made like next and manufactured. In addition, this production process is typically shown in drawing 9 . It is particle diameter 0.1 like an example 1. The slurry containing the ACP particle below mum was prepared.

It diluted with ion exchange water and beta-cyclodextrin was distributed 100 g to obtained ACP slurry 1500g so that the concentration of ACP might become 10 % of the weight about this slurry. It is 5000rpm by the homomixer. Carrying out convection-current churning, 10g of allyl isothiocyanates was added gradually, and churning was performed for 90 minutes. Thus, inclusion of the allyl isothiocyanate is mainly carried out to beta-cyclodextrin, and it is clathrate compound 30c. ACP particle 31c Included slurry 3c was obtained.

[0050] Obtained slurry 3c was supplied to the spray dryer (Okawara chemically-modified machine company make L-8) 5 by the amount of supply 1 - 3 kg/h with the metering pump 4. It is 10000 - 30000 rpm about the atomizer 6 of a spray dryer 5. It is ACP particle 31c by adjusting outlet temperature [in / for the inlet temperature of the heat gas chamber 11 / 150 - 200 ** and an exhaust port] to 60 - 100 **, and carrying out spraying granulation, while setting up. Clathrate compound 30c Included antibacterial particle (antibacterial particle B) 1c was obtained. this antibacterial particle B -- abbreviation -- it was spherical and mean particle diameter was about 50 micrometers. In addition, it is assumed by the above-mentioned antibacterial particle B that some allyl isothiocyanates are adsorbed by ACP.

[0051] After mixing the obtained antibacterial particle B4 weight section and the EVA resin 96 weight section, kneading and the sheet B for phylaxis whose average thickness extrusion is carried out and is about 20 micrometers were manufactured using the extruder.

[0052] [Example 3] The clathrate compound which carried out inclusion of the Khiva extracted oil to the cyclodextrin was manufactured as follows. It is 24000 rpm by the homomixer about water 200 g. 100 g addition of beta-cyclodextrin was done carrying out convection-current churning, 10g (trade name: Aomori Khiva essential oil (Khiva use from Aomori Prefecture), OSAKA ORGANIC CHEMICAL INDUSTRY, LTD. make) of Khiva extracted oil was added after that, and churning was performed for 1 hour. The slurry obtained here was supplied to the spray dryer (Okawara chemically-modified machine company make L-8) 5 by the amount of supply 1 - 3 kg/h with the metering pump 4. It is 10000 - 30000 rpm about the atomizer 6 of a spray dryer 5. While setting up, the clathrate compound particle (clathrate compound particle C) which carried out inclusion of the Khiva extracted oil to the cyclodextrin was obtained by adjusting outlet temperature [in / for the inlet temperature of the heat gas chamber 11 / 150 - 200 ** and an exhaust port] to 60 - 100 **. The mean particle diameter of this clathrate compound particle C was about 20 micrometers.

[0053] The obtained clathrate compound particle C and the ACP particle obtained in the

example 1 were enough mixed by the Omni mixer (made in Chiyoda Research Institute) so that it might become the weight ratio of 9:1 (a clathrate compound particle / ACP particle). To this mixture C20 weight section, they are the vinyl acetate 20 weight section, the toluene 60 weight section, the chlorination polypropylene 12 weight section, and polyethylene wax 0.5. What added the weight section and the methyl-ethyl-ketone 16 weight section was used as the ink constituent. This ink constituent was applied to one whole field of the sheet made of polypropylene resin of thickness about 1.0 mm by gravure. Subsequently, slitting with a die length of 1cm was prepared in this whole sheet by 1cm width of face, and it considered as the sheet C for phylaxis. The sheet C for phylaxis has an appearance as shown in drawing 3 .

[0054] [Example 4] They are the vinyl acetate 20 weight section, the toluene 60 weight section, the chlorination polypropylene 12 weight section, and polyethylene wax 0.5 to the mixture A20 weight section obtained in the example 1. What added the weight section and the methyl-ethyl-ketone 16 weight section was used as the ink constituent. This ink constituent was partially applied to one field of textile fabrics (product made from a vinyl chloride) with a thickness of 2mm by gravure, and was used as the sheet D for phylaxis. The sheet D for phylaxis has an appearance as shown in drawing 10. 2" shows textile fabrics among drawing 10, and 22 shows the printing section.

[0055] [Example 5] After sprinkling the mixture A obtained in the example 1 on a nonwoven fabric (the product made from polypropylene, 50 g/m2) so that it may be set to about 5g/m2, the laminating of the same nonwoven fabric was carried out to the above-mentioned nonwoven fabric on it. The nonwoven fabric of these two sheets formed many 10cmx10cm bag parts, and after sprinkling the clathrate compound particle A on the above-mentioned nonwoven fabric so that a clathrate compound particle and an ACP particle may be grasped in the bag part, it heat sealed using heat sealing equipped with the heating seal section in the shape of a stitch. Thus, the obtained sheet E for phylaxis has an appearance as shown in drawing 7 .

[0056] [Example 6] The shellac resin (GIFUSE rack company make) 10 weight section was dissolved in the ethanol 90 weight section, and this was sprayed on the nonwoven fabric (the product made from polypropylene, 50g/m2) so that it might become 20-50 micrometers of thickness with a spray gun. Subsequently, on this shellac resin layer, the clathrate compound particle B obtained in the example 1 was sprayed with fine particles so that it might become about 5 g/m2. In addition, the shellac resin used by this example is natural resin, and is used as a food additive.

[0057] [Example 1 of a trial] Number of microorganism is about 103 with the sterilization physiological saline after cultivating Candida albicans under 30 degrees C

by the potato dextrose agar (EIKEN CHEMICAL CO., LTD. make) for 18 to 24 hours. It prepared so that it might be set to an individual/ml, and it considered as trial fungus liquid. 5ml (product made from Japanese-made Medicine) of GPLP agar media is poured distributively on each plastics petri dish (diameter of 5cm), and it solidifies on it -- making -- the inside of a clean bench -- after an air dried and the above-mentioned trial fungus liquid -- every [0.1 ml] -- the smear -- carrying out -- these -- a trial -- it was presupposed that it is monotonous. The number of microorganism of the used trial fungus liquid was measured with the pour-plate culture method (for 25 degrees C and seven days) using a GPLP agar medium, and inoculation number of microorganism was computed.

[0058] Clathrate compound particle A 0.5g and the above-mentioned trial plate which were obtained in the example 1 were put into the angle container made from plastics (1.6 liter capacity) with the beaker of 50ml of water into which it went, and it covered, and cultivated at 30 degrees C. The existence of the bacillus growth on trial monotonous was observed with the naked eye two days after culture. In addition, it examined similarly about the case where the clathrate compound particle A is not put in as contrast. A result is shown in Table 1.

[0059] By the almost same approach, they are Salmonella enteritidis, Staphylococcus aureus, and Vibrio cholerae. And Vibrio parahaemolyticus It examined, even if attached. However, Salmonella enteritidis and Staphylococcus aureus It received and 1g of clathrate compound particles A was used. A result is combined and is shown in Table 1.

[0060]

[Table 1]

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試 験 菌	対 象	接種菌数*1	2日後集落数
Candida albicans	包接化合物粒子A	330	0
	対 照	330	∞
Salmonella enteritidis	包接化合物粒子A	290	0
	対 照	290	∞
Staphylococcus aureus	包接化合物粒子A	330	0
	対 照	330	∞
Vibrio cholerae	包接化合物粒子A	320	0
	対 照	320	∞
Vibrio parahaemolyticus	包接化合物粒子A	220	0
	対 照	220	∞

＊1　使用した菌液の菌数を測定し、試験平板1枚当たりの接種菌数を求めた。

[0061] The clathrate compound particle used by this invention so that clearly from Table 1 is Candida albicans, Salmonella enteritidis, Staphylococcus aureus, and Vibrio cholerae. And Vibrio parahaemolyticus It excels in the receiving antibacterial action.
[0062] [Example 2 of a trial] Number of microorganism is Escherichia coli (Escherichia coli) 2.9x109 It cultivated until it was set to an individual/ml. the 1 time diluent (it does not dilute) of this fungus liquid, and 100 A twice diluent, a 10,000 time diluent, and 1,000,000 a twice diluent -- preparing -- respectively -- 10microl every -- L plate -- a top -- it was dropped. Clathrate compound particle A0.1 g obtained in the example 1 was installed inside the top cover of L plate, the top cover was put on the

above-mentioned plate which trickled the bacillus, and it was made the vertical upside-down. It cultivated under 37 degrees C in the condition, and the number of microorganism after 24-hour progress was investigated. A result is shown in Table 2.

[0063] Moreover, the trial with the same said of the clathrate compound particle C obtained in the example 3 was performed. A result is combined and is shown in Table 2. On the other hand, each clathrate compound particle was produced like the example 3 using cypress oil (OSAKA ORGANIC CHEMICAL INDUSTRY, LTD. make) and limonene oil (Yasuhara Chemical make). The same trial as the above was performed about clathrate compound particle (clathrate compound particle H) 2.5 g of above-mentioned cypress oil 1ml, limonene oil 1ml, and the obtained cypress oil, and clathrate compound particle (clathrate compound particle L) 2.5 g of limonene oil. A result is shown in Table 2.

[0064]

[Table 2]

希釈倍率（倍）		1	100	10,000	1,000,000
培養開始時の菌数（g／ml）		2.9×10^8	2.9×10^7	2.9×10^5	2.9×10^3
24時間経過後の菌数（g／ml）	包接化合物粒子A	0	0	0	0
	包接化合物粒子C	0	0	0	0
	ヒノキオイル	∞	∞	∞	6
	リモネンオイル	∞	∞	∞	21
	包接化合物粒子H	∞	∞	∞	12
	包接化合物粒子L	∞	∞	∞	15

[0065] Although the clathrate compound particle used by this invention is excellent in the antibacterial action to Escherichia coli, cypress oil, limonene oil, and those clathrate compound particles do not almost have an antibacterial action to Escherichia coli, so that clearly from Table 2.

[0066] [Example 3 of a trial] Cytrobacter freundii and Proteus mirabilis which are known for an opportunistic infection, Klebsiella pneumomiae, and Serratia marcescens Number of microorganism is 5.2x109, respectively. An individual/ml, and 1.3x109 An individual/ml, and 9.4x109 An individual/ml, and 3.3x109 It cultivated until it was set to an individual/ml. The 1 time diluent (it does not dilute) of these fungus liquid, and 100 A twice diluent, a 10,000 time diluent, and 1,000,000 The twice diluent was prepared and it examined about the antibacterial action of the clathrate compound particle A like the example 2 of a trial. A result is shown table 3.

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[0067]

[Table 3]

希釈倍率（倍）		1	100	10,000	1,000,000
24時間経過後の菌数（g／ml）	Cytrobacter freundii	0	0	0	0
	Proteus mirabilis	0	0	0	0
	Klebsiella pneumoniae	0	0	0	0
	Serratia marcescens	0	0	0	0

[0068] the clathrate compound particle used by this invention so that clearly from Table 3 -- Cytrobacterfreundii, Proteus mirabilis, Klebsiella pneumomiae, and Serratia marcescens etc. -- it excels in the antibacterial action to a bacillus.

[0069] [Example 4 of a trial] The transpiration of allyl isothiocyanate (AIT) when setting the sheets A, B, D, and E for phylaxis under 80% of humidity was measured. Measurement of transpiration was performed as follows.

[0070] Each sheet for phylaxis (10cmx10cm) was contained and sealed with the nonwoven fabric in a package and 1100ml glassware (it holds to 80% of humidity). The amount of allyl isothiocyanates in the air in this glassware was measured by the gas-chromatography method with time. A result is shown in the graph of drawing 11. In addition, the Measuring condition of the gas-chromatography method was as follows.

[0071] (Measuring condition)

Detector: FID column :P EG20M (25cm of column length, 0.25mm of diameters of a column, 0.25 micrometers of thickness)

inlet temperature: -- 200 ** detector temperature: -- 230 ** carrier gas: -- helium 11.3psi (70 degrees C)

The temperature-up pattern of column oven: It is 1.75min to 70degree-C(1min) ->100 ** at temperature up (40-degree-C / min) ->220 ** to temperature up (5-degree-C / min) ->220 **. Maintenance [0072] As a comparison, it examined similarly about the sheets A, B, D, and E for phylaxis, and the sheet manufactured similarly except not mixing an ACP particle. The sheets A, B, D, and E for phylaxis can demonstrate antibacterial effectiveness for 21 days under 80% of humidity so that clearly from the graph of drawing 11. That is, the sheet for phylaxis by this invention can demonstrate the period antibacterial effectiveness of 3 times or more as compared with the sheet which does not mix an ACP particle.

[0073] [Example 5 of a trial] About the ACP particle obtained in the example 1, as it was the following, the adsorption capacity force of a stinking component was examined.

The measuring device used for drawing 12 by the exam is shown roughly. First, two cc of aqueous ammonia was dropped at 300ml wide mouth Mayer 51 25%, and it sealed with the silicon plug 52 which let the glass tube (bore of 5mm) 53 pass at the core. Next, it considered as the sample, and 1.2g weighing capacity of the above-mentioned ACP particle was carried out to the glass sample tubing 56 which has the approximate circle column-like openings 56a and 56a, and it was put into both ends at it. Then, cotton plugs 55 and 55 were given to the openings 56a and 56a of a sample tubing 56 so that a sample might not come outside.

[0074] Subsequently, the silicon tubes 54 and 54 were separately connected to the outside edge of double door regio-oralis 56a of a sample tubing 56. And the other end of the silicon tube 54 which connected to the outside edge of the glass tube 53 of the above-mentioned silicon plug 52 the other end of the silicon tube 54 connected to one opening 56a, and was connected to opening 56a of another side was connected to inlet 57a of the stinking sensor (KOSUMO electrical machinery company make, a portable mold a stinking sensor, XP- 329) 57.

[0075] Using the measuring device which has the above configurations, the gas in Mayer 51 was attracted through the sample tubing 26, and the adsorption capacity force of the stinking component of the ACP particle within a sample was measured by the stinking sensor 57. In addition, the above-mentioned smell sensor 57 evaluates the concentration of a stinking component by the digital display value, and it shows that the adsorption capacity force of the stinking component of a sample is excellent, so that this indicated value is small.

[0076] The adsorption capacity force of a stinking component was measured like the above about the hydroxyapatite (HAP), alumina, and silica which were made into the shape of fine particles so that it might become the same particle size as an ACP particle as contrast. A measurement result is shown in Table 4. In addition, measured value is a digital display value at the time of change of measured value being stabilized after sampling initiation.

[0077]

[Table 4]

試 料	測定値
ACP粒子	46
HAP粒子	82. 3
アルミナ粒子	241
シリカ粒子	248

[0078] the ACP particle used by this invention is markedly boiled as compared with a HAP particle, an alumina particle, and a silica particle, and the adsorption capacity force is excellent so that clearly from Table 4.

[0079] [Example 6 of a trial] The sheet A for phylaxis (about 3.8 diameter cm) obtained in the example 1 was placed into the styrol petri dish of about 3.8 diameter cm, and depth about 0.5 cm, and the powder feed (the product made from Oriental Yeast, powder feed MF for mite breeding) of 0.1 g was placed in the center. this -- the center of the styrol petri dish of diameter 8.5 cm and depth 1.4 cm -- placing -- between a central petri dish and outside petri dishes -- NOSHIMEMADA lame -- a clothes moth (after hatching larva for about 14 days) -- 25 individuals -- releasing -- a hole with a diameter of 5cm -- vacating -- 120 It covered with the lid which stuck the wire gauze of a mesh.

[0080] After putting this petri dish for two days under a room temperature, counting of the population of the larva which moved to the central petri dish was carried out. Four partitions were followed in this trial. In addition, the trial when not putting in the sheet for phylaxis by the same approach as contrast was performed. A result is shown in Table 5.

[0081]

[Table 5]

		中央のシャーレの生存個体数	外側のシャーレの生存個体数	死亡個体数	移動率*1	平均移動率
感染防御用シートA（処理区）	①	10	11	4	47.6 %	39.0%
	②	6	15	4	28.6 %	
	③	7	15	3	31.8 %	
	④	11	12	2	47.8 %	
対照（無処理区）	①	18	4	3	81.8 %	73.5%
	②	15	8	2	65.2 %	
	③	17	5	3	77.3 %	
	④	16	7	2	69.6 %	

*1 移動率（%）＝ 中央のシャーレの生存個体数 / 総生存個体数 ×100

[0082] If the rate of evasion of the sheet A for phylaxis is computed by the following formulas, it will become 46.9% from the value of Table 5.

average movement ratio x100 of rate (%) of evasion = (average movement ratio of the average movement ratio-processing division of a non-processed division) /

non-processed division -- clear from this result -- as -- the sheet for phylaxis of this invention -- NOSHIMEMADA lame -- it excels in the evasion effectiveness over the larva of a clothes moth.

[0083] [the example 7 of a trial] -- the place which cut the sheet D for phylaxis obtained in the example 4 for 2cm around, stuck and stuck it on 41 adult test subjects' (man and woman in his his twenties - 50's)-overarm flank, and performed observation 24 hours after -- any test subject -- the itching -- it is swollen, and there are not ******, other sense of incongruity, etc., and change of condition did not take place, either.

[0084]

[Effect of the Invention] According to this invention, especially in a sickbed, an antimicrobial agent can be made full, and the skin disease by pathogen living things with which the patient who is in the immunological deficient state of an acquired immunode-ficiency syndrome patient, a transplant patient, a leukemia patient, an innate immunity insufficiency patient, etc. including elderly people tends to be infected, such as Candida albicans and Sacoptes scabiei, or a bedsore can be effectively defended over a long period of time. Moreover, the smell which is easy to generate in a sickbed etc. is also effectively removable.

[Brief Description of the Drawings]

[Drawing 1] It is the outline sectional view of the sheet for phylaxis with an example of this invention.

[Drawing 2] It is the outline sectional view of the sheet for phylaxis by other examples of this invention.

[Drawing 3] It is the perspective view of the sheet for phylaxis by other examples of this invention.

[Drawing 4] It is the outline sectional view of the sheet for phylaxis by other examples of this invention.

[Drawing 5] It is the perspective view of the sheet for phylaxis by other examples of this invention.

[Drawing 6] It is the perspective view of the sheet for phylaxis by other examples of this invention.

[Drawing 7] It is the perspective view of the sheet for phylaxis by other examples of this invention.

[Drawing 8] It is drawing explaining the production process of the clathrate compound particle used for the sheet for phylaxis of this invention, or an ACP particle.

[Drawing 9] It is drawing explaining the production process of the antibacterial particle

used for the sheet for phylaxis of this invention.

[Drawing 10] It is the perspective view of the sheet D for phylaxis manufactured in the example 4.

[Drawing 11] It is the graph which shows aging of the transpiration of the allyl isothiocyanate from the sheets A, B, D, and E (ACP particle un-containing [ACP particle content,]) for phylaxis.

[Drawing 12] It is the schematic diagram of the measuring device of the stinking component adsorption capacity force used in the example 5 of a trial.

[Description of Notations]

1 -- Particle
1 a--ACP particle
1b -- Clathrate compound particle
1c -- Antibacterial particle
10 -- Paint film
2 -- Sheet
2' -- Nonwoven fabric
2" -- Textile fabrics
20 -- Slitting
21 -- Bag part
22 -- Printing section
3a, 3b, 3c -- Slurry
30c -- Clathrate compound
31c -- ACP particle
4 -- Metering pump
5 -- Spray dryer
6 -- Atomizer
8 -- Cyclone
9 -- Air filter
10' -- Electric heater
11 -- Heat gas chamber
12 -- Discharge hole
51 -- Wide mouth Mayer
52 -- Silicon plug
53 -- Glass tube
54 -- Silicon tube
55 -- Cotton plug

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56a -- Opening

56 -- Sample tubing

57 -- Stinking sensor

57a -- Inlet